

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/799,081
Applicant : ABE, Saburo et al.
Filed : 03/12/2004
Title : FUEL CELL STACK COOLANT COMPOSITION
TC/A.U. : 1751
Examiner : HAMLIN, Derrick G.
Docket No. : 3216/1
Customer No. : 23638

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION OF NAOSHI ITO

I, Naoshi Ito, hereby declare that:

1. My name is Naoshi Ito. I am an adult over the age of twenty-one years, and I am competent to make this declaration.
2. I am one of the inventors of the above-referenced patent application.
3. I Graduated in 1994 from Gifu University, Faculty of Engineering, Department of Applied Chemistry. In 1994, I joined Shishial-Kabushikigaisha (CCI Corporation) in the Chemical Engineering Group, Engineering Department. I have eleven years of experience in the research and development of automobile engine coolants.
4. I have conducted tests to directly compare the electric conductivity of the compositions of the above-referenced patent application, and the compositions disclosed in U.S. Patent No. 5,725,794 to Bruhnke et al.

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5. The following equipment and reagents were used in the testing:

HORIBA CONDUCTIVITY METER ES-12

Sulphur Blue 13: Asathio Indigo RC (ASAHI CHEMICAL CO. , LTD.)

vat Blue 6: CIBANONE Blue GFJ MD (Ciba Specialty Chemicals K.K.)

Solvent Blue 63: Waxoline Blue AP FW (Avecia Industrial Colours)

Reactive Black 5: CIBANONE Black CI-5HC(Ciba Specialty Chemicals K.K.)

Reactive Blue 5: CIBANONE Blue P-BR(Ciba Specialty Chemicals K.K.)

Reactive Orange 13: CIBANONE Orange P-2R(Ciba Specialty Chemicals K.K.)

Reactive Yellow 95: CIBACRON Yellow P-8GS(Ciba Specialty Chemicals K.K.)

6. The dyes used in the composition of Bruhnke et al. include sulfone radicals as shown in the chemical structures #1 - #5 attached to this declaration, while the dyes used in the invention of the present application do not include sulphone radicals or carboxyl radicals. This structural difference yields unexpected and superior results in the present invention over the composition of Bruhnke et al. as shown in the test results below.

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7. Electric conductivity was measured for each sample containing 0.01 wt% dye.

The results are shown in the following table.:

<u>Ingredient (% by wt)</u>	Present Invention			Bruhnke et al.			
	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>
Ethylene glycol	50	50	50	50	50	50	50
Deionized water	rest	rest	rest	rest	rest	rest	rest
Sulphur Blue 13	0.01						
Vat Blue 6		0.01					
Solvent Blue 63			0.01				
Reactive Black 5				0.01			
Reactive Blue 5					0.01		
Reactive Orange 13						0.01	
Reactive Yellow 95							0.01
Electric Conductivity ($\mu\text{S}/\text{cm}$):	0.6	0.8	0.4	16	25	14	19

8. The above results show that the present invention has significantly lower electrical conductivity than the compositions of Bruhnke et al. The difference is of both statistical and practical significance. The significantly lower electrical conductivity of the present invention is of particular benefit in its intended use as a coolant for a fuel cell.
- Further declarant sayeth not.

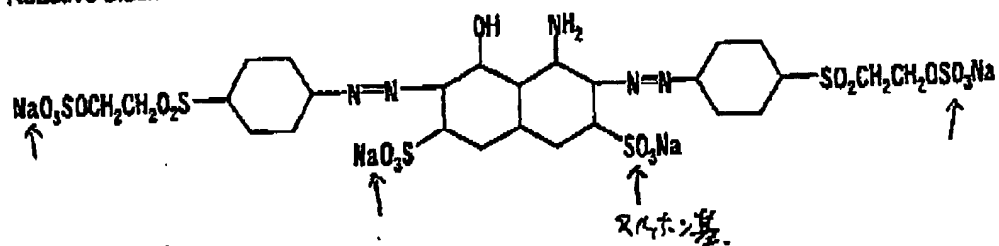
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Naoshi Ito
Naoshi Ito

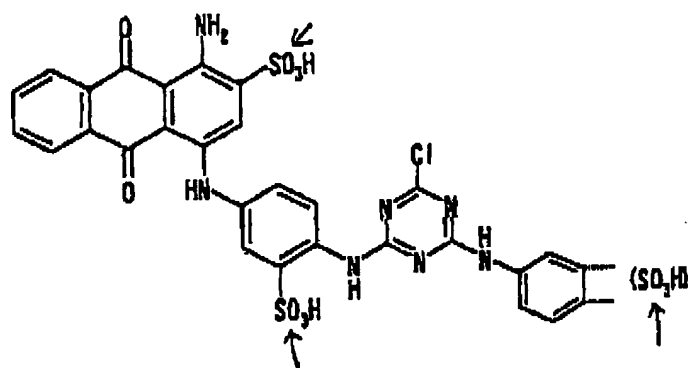
July 15, 2005
Date

染料構造1

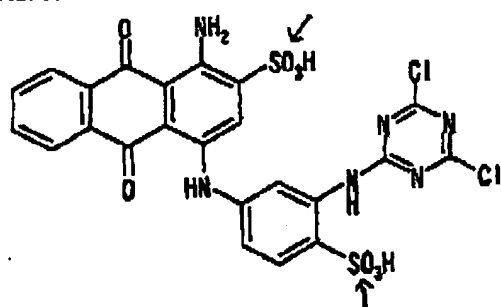
Reactive Black 5



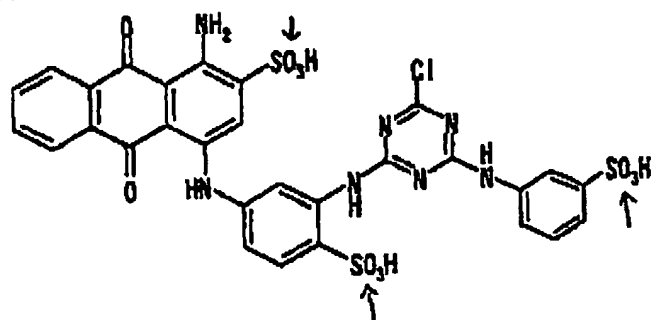
Reactive Blue 2



Reactive Blue 4



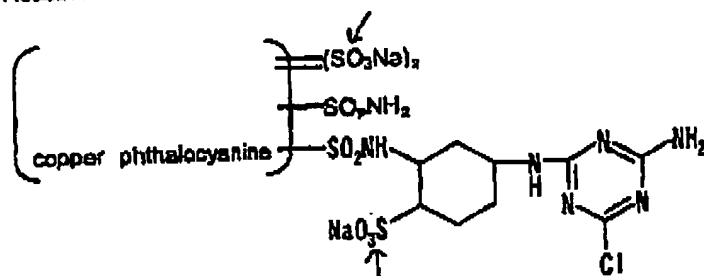
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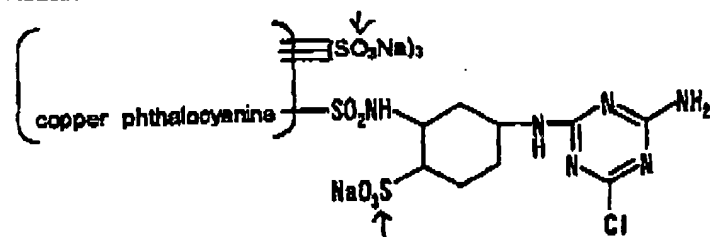
Structure # 1

染料構造2

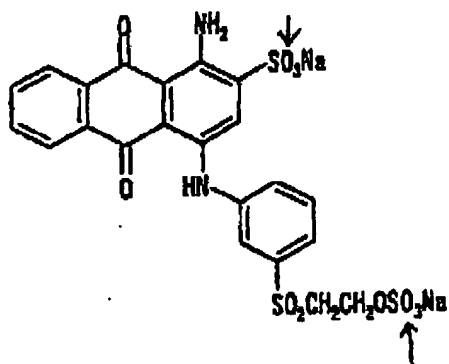
Reactive Blue 7



Reactive Blue 15



Reactive Blue 19



Reactive Blue 27

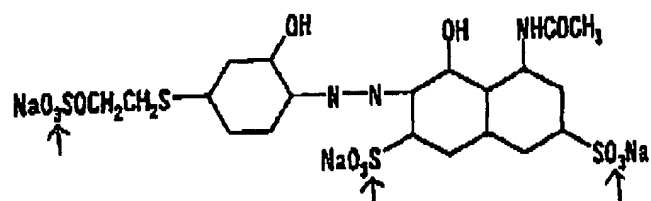
情報なし

Structure # 2

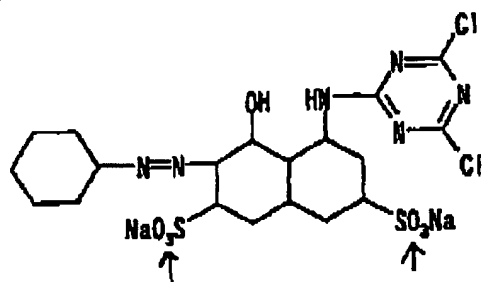
染料構造3

Reactive Violet 3 情報なし

Reactive Violet 5



Reactive Red 2

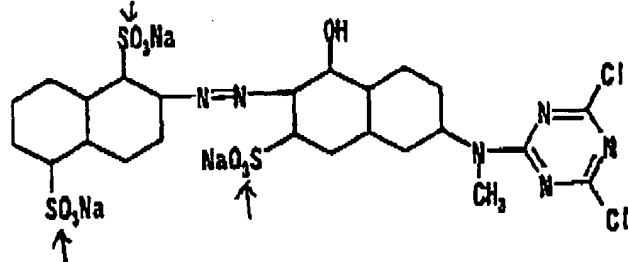


Reactive Red 24 情報なし

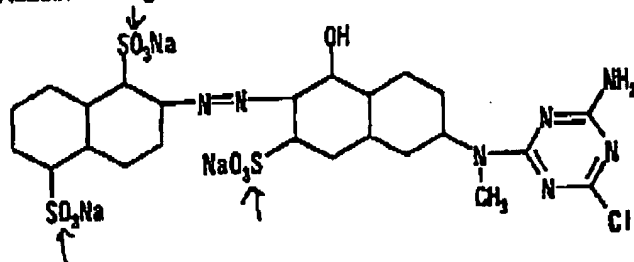
Structure # 3

染料構造4

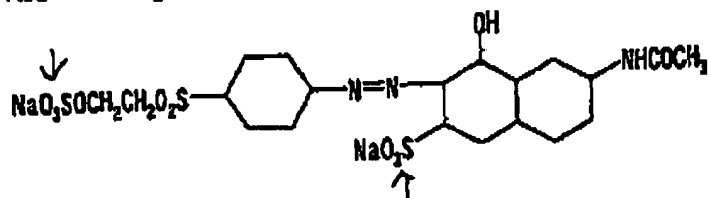
Reactive Orange 4



Reactive Orange 13



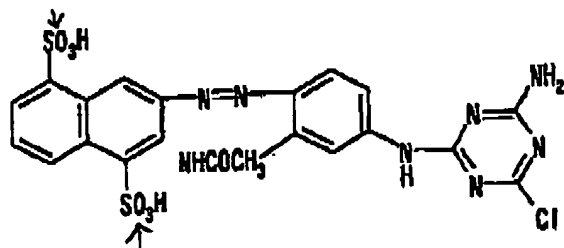
Reactive Orange 16



Reactive Orange 78

情報なし

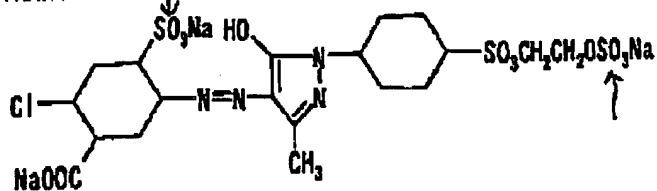
Reactive Yellow 3



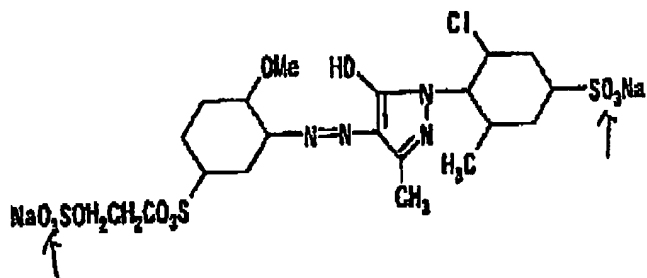
Structure # 4

全料構造5

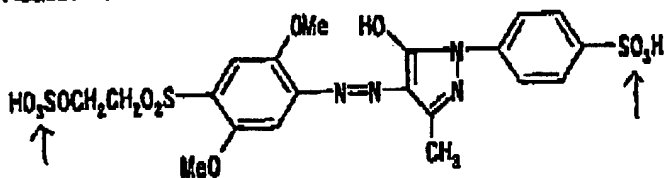
Reactive Yellow 13



Reactive Yellow 14



Reactive Yellow 17



Reactive Yellow 95

情報なし

Structure # 5